

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Previously Presented) An electrostatic levitation furnace comprising a vacuum chamber, main electrodes opposed to each other within the vacuum chamber, auxiliary electrodes which move a sample levitated due to an electrostatic field generated between the main electrodes to a predetermined position, and laser irradiators which irradiate a laser beam on the sample displaced to the predetermined position to melt the sample, wherein a plurality of the main electrodes are arranged at proper intervals in a vertical direction to form electrostatic field generating interspaces between the adjacent main electrodes respectively, the auxiliary electrodes are arranged to correspond to each of the electrostatic field generating interspaces, the laser irradiators are arranged both above an uppermost one of said main electrodes and under a lowermost one of said main electrodes to be opposed to each other coaxially, and one of said main electrodes positioned midway between the uppermost one and the lowest one has a through-hole which is on an optical path of laser beam and through which a sample can be passed.

2. (Currently Amended)) An electrostatic levitation furnace comprising a vacuum chamber, main electrodes opposed to each other within the vacuum chamber, auxiliary electrodes which move a sample levitated due to electrostatic field generated between the main electrodes

to a predetermined position, and laser irradiators which irradiate the sample displaced the predetermined position to melt the sample, wherein plural pairs of the main electrodes forming electrostatic field generating interspaces are arranged stacked in a vertical direction, the auxiliary electrodes are arranged to correspond to each of the electrostatic field generating interspaces, the laser irradiators are arranged both above an uppermost one of said main electrodes under a lowermost one of said electrodes, and ~~the~~one of said main electrode positioned midway between the uppermost lowest one has a through-hole on an optical path of laser beam which a sample can be passed through.

3. (Previously Presented) An electrostatic levitation furnace according to claim 1 wherein an image pickup device comprising a CMOS camera or a CCD camera photographing a sample, a background light source irradiating a light on a sample, and a digital signal processor executing image

processing which enhances the edge of an image in real time and outputting a position of the center of gravity of a sample put in a levitation state is provided so as to extend to adjacent electrostatic field generating interspaces.

4. (Previously Presented) A method for fusing samples together using an electrostatic levitation furnace, comprising, in fusing a plurality of species of samples all together using an electrostatic levitation furnace according to claim 1;

a step for levitating a first sample on an optical path of a laser beam in either of plural electrostatic field generating interspaces and subsequently irradiating the laser beam on the first sample from a laser irradiator at the side of one main electrode to melt the sample;

a step for, while levitating a first sample maintained in a melted state by irradiating a laser beam on the first sample, levitating a second sample on an optical path of a laser beam in another of said electrostatic field generating interspaces and subsequently irradiating a laser beam on the second sample from another laser irradiator at the side of the other main electrode to melt the sample;

a step for moving the sample positioned in an upper one of the electrostatic field generating interspaces which levitate the first and the second samples in melted states respectively from said upper one electrostatic field generating interspace through a through-hole of a main electrode positioned midway to said lower one electrostatic field generating interspace while controlling the temperature, position, and fall velocity of the sample, and subsequently fusing the samples in melted states together while levitating them;

a step for stopping irradiation of laser beams from both the upper and the lower laser irradiators to solidify a fused body from the first and the second samples, and subsequently moving the fused body at a predetermined position in the lower electrostatic field generating interspace, wherein a plurality of species of samples are fused all together through the above-mentioned steps.